Effect of olive oil & tomato lycopene combination on some CHD risk factors

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Average fat intake (% energy) in men in the 1960's*

	Traditional Mediterranean (Crete)	Traditional Japanese (Kyushu)	Traditional US
Total fat	40	9	40
Saturated fat	8	3	17
Monounsaturated fat	29	3	17
Polyunsaturated fat	3	3	6

* Keys et al. Circulation 1970

Australia – Imports of Olive Oil

Year	Virgin		Refined	
	Tonnes	Percent	Tonnes	Percent
1996-97	4407	21	16890	79
1998-99	5292	23	18020	77
2000-01	7930	27	21691	73

Source – International Olive Oil council

http://www.internationaloliveoilcouncil.org/tm/australia/imports.html

Lycopene

- Epidemiological data
  - Populations with high intake
  - Populations with high serum levels
  - Populations with high tissue levels

Lower risk of heart disease

Aims

To investigate the effects of two lipid lowering diets high in lycopene on:

- serum lycopene levels
- serum lipid profile
- serum lipid oxidation

Methodology

Design: randomised cross-over

Subjects: 21-70 years, non smoking, not on lipid lowering drugs or supplements

OO - monounsaturated fat enriched olive oil diet; HC - high carbohydrate low fat diet
LCD - low carotenoid diet

Fasting bloods	day 1,11
Body weight	every alternate day

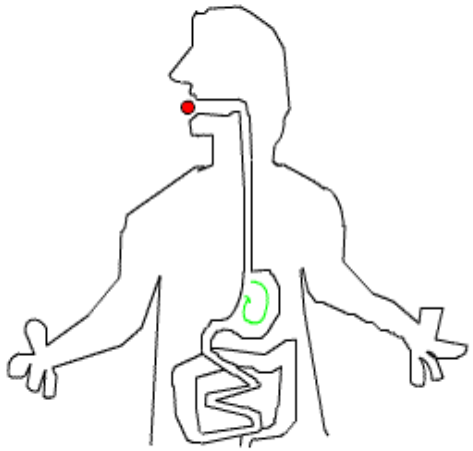
Dietary Composition

	OO diet	HC diet
Total fat	36-38%	15-17%
Carbohydrate	42-44%	63-65%
Protein	15-18%	15-18%

Isocaloric to habitual diet

Lycopene (20.2 mg/day) tomato paste, tomato soup

Controlled alcohol intake



Controlled fibre, cholesterol, vitamin C

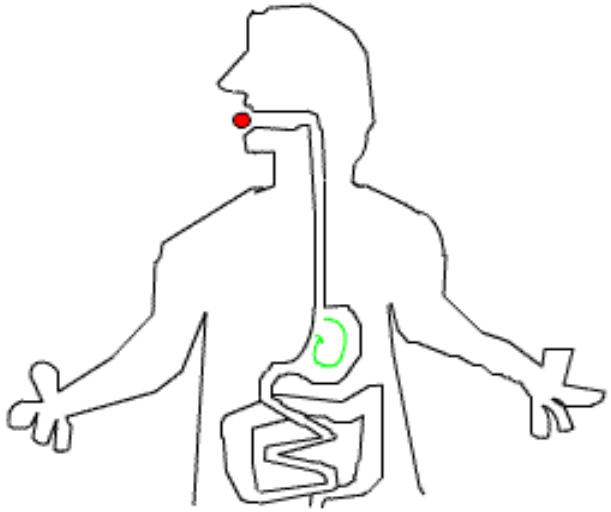
Controlled heating temperature and time for cooking

Restricted fruit and vegetable intake to control other carotenoid content

OO monounsaturated fat enriched olive oil diet; HC high carbohydrate low fat diet

Dietary Compliance

Provision of some food



Diet diaries

Study subjects

Numbers	21 (6 men, 15 women)
Age (years)	44.4 ± 12.3
BMI	24.3 ± 3.5
Total Cholesterol (mmol/L)	5.06 ± 0.8

Mean ± SD

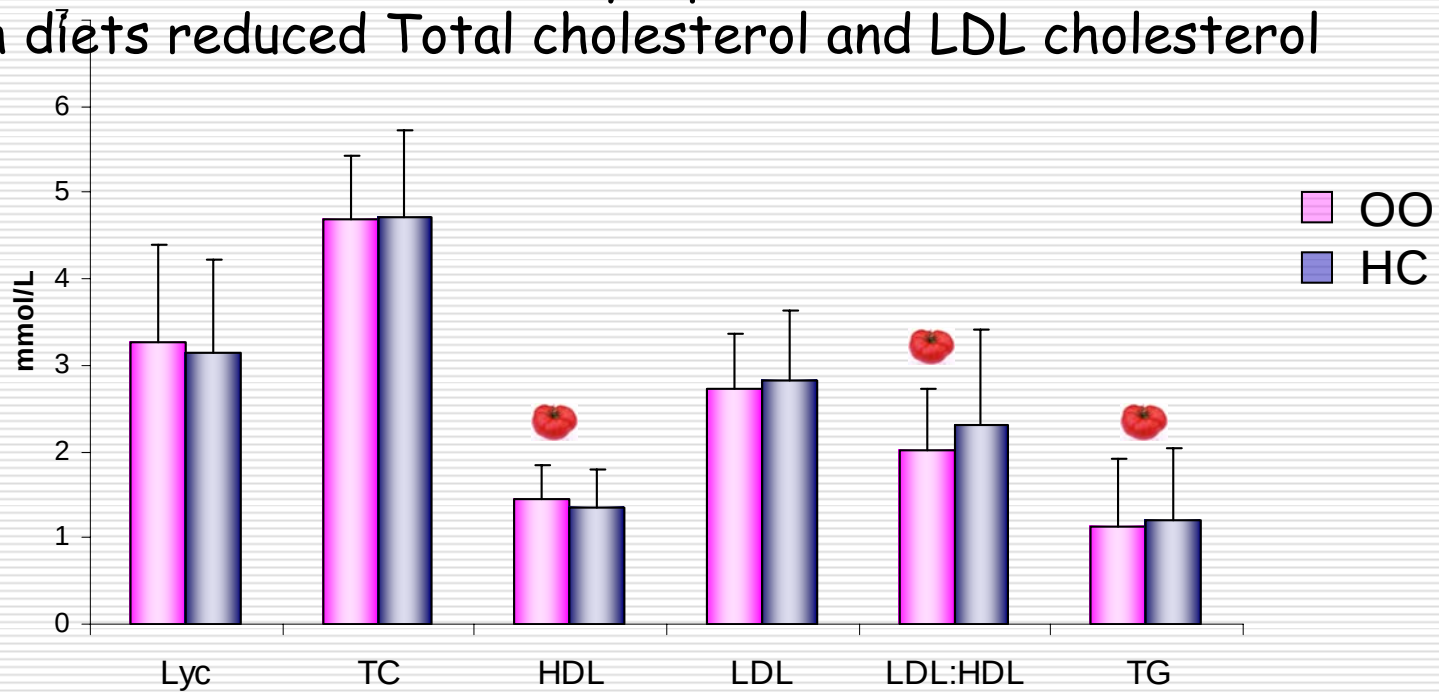
Dietary Intake (from 4 day diet records)

	OO	HC
Energy (MJ)	8.5 ± 1.5	8.3 ± 1.4
Protein % energy	16.7 ± 2.5	18.1 ± 2.2*
Carbohydrate %energy	47.5 ± 4.3	64.7 ± 4.8*
Fat % energy	34.4 ± 3.5	16.5 ± 4.0*
Monounsaturated (% of total energy)	19.6 ± 2.1	6.4 ± 2.8*
Polyunsaturated to Saturated fat ratio	0.8 ± 0.2	0.9 ± 0.4
Fibre (g)	31.0 ± 7.5	32.4 ± 7.5

* Different from OO diet, $p<0.05$; OO olive oil diet; HC high carbohydrate diet; n = 18, mean ± SD

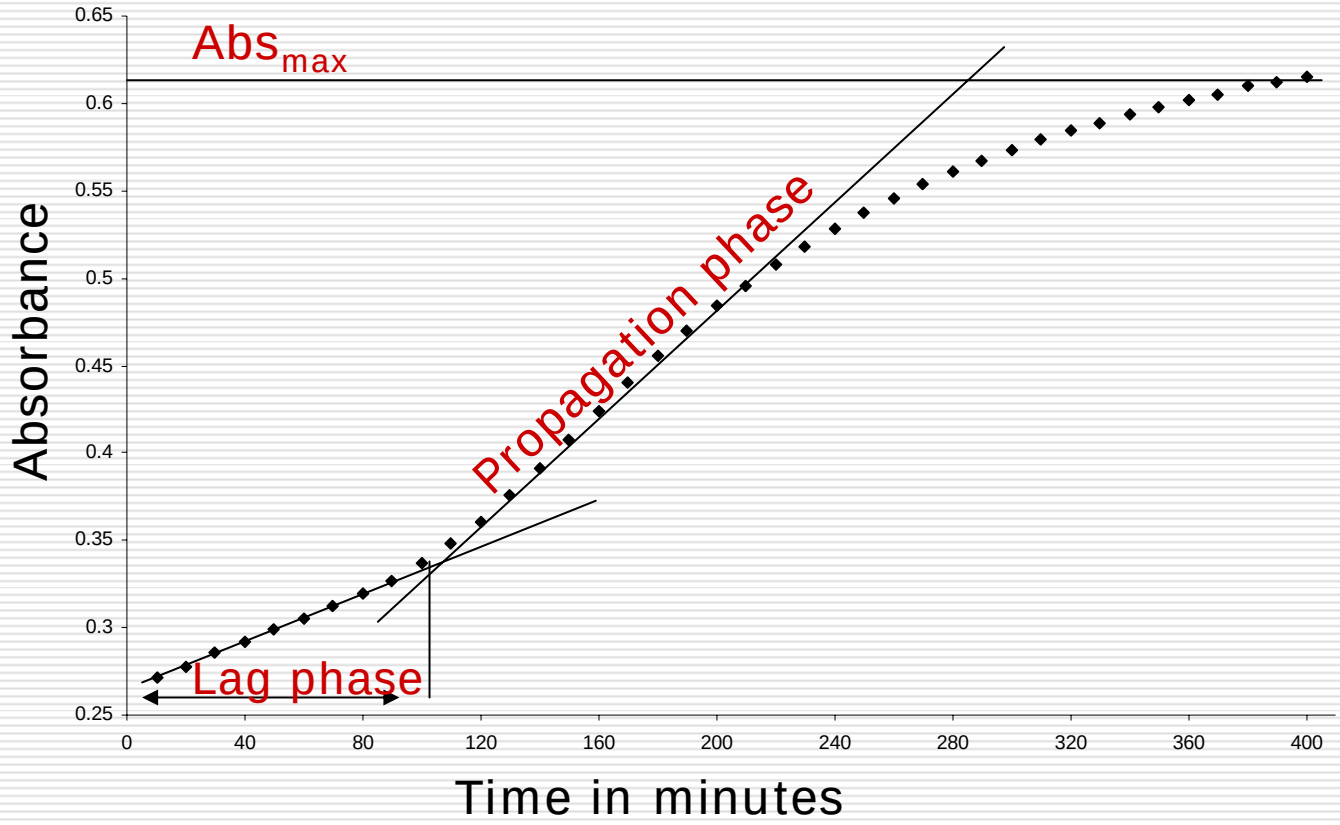
Serum lycopene and lipids

- Baseline levels – no statistically significant difference
- Both diets increased serum lycopene levels
- Both diets reduced Total cholesterol and LDL cholesterol

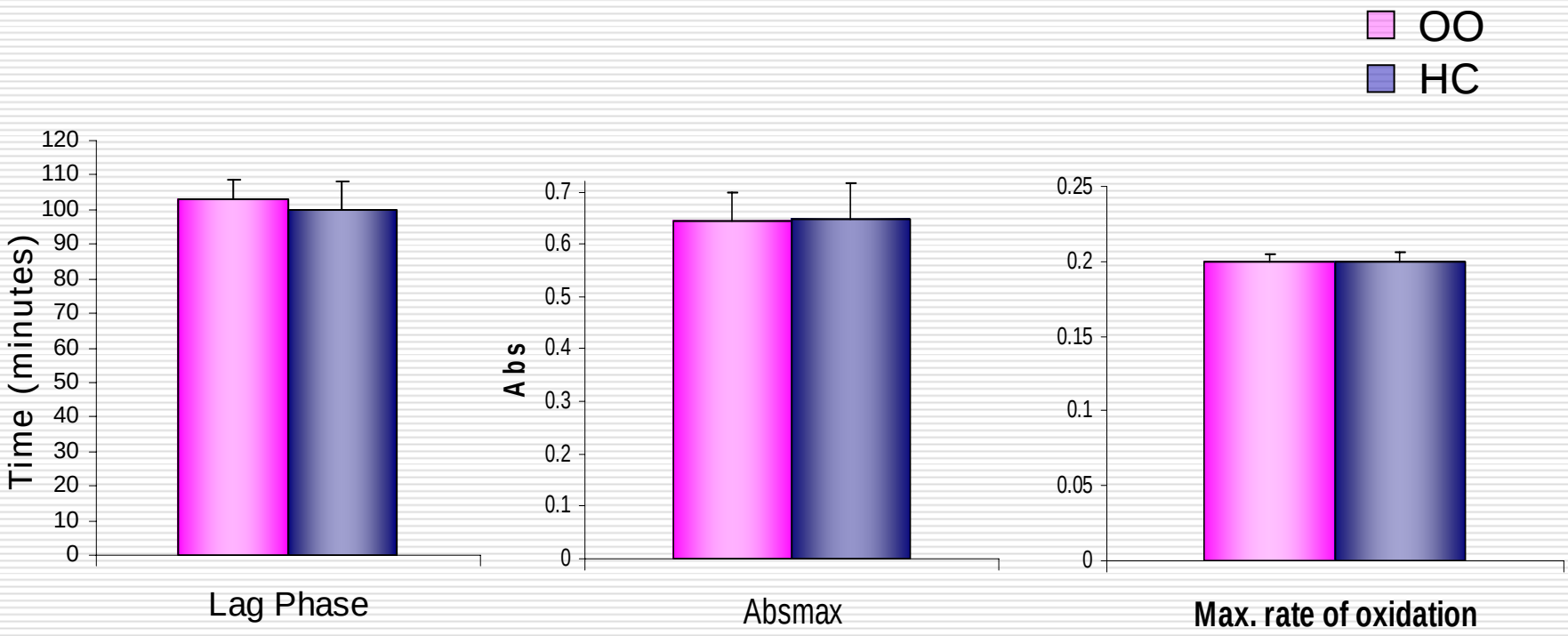


Statistically different from end of HC diet; OO olive oil diet; HC high carbohydrate low fat diet; n = 21, mean ± SD

Serum Oxidation



Serum Oxidation



OO olive oil diet; HC high carbohydrate low fat diet; n = 16, mean ± SEM

Summary

- Similar increase in serum lycopene levels with 15% or 35% of energy from fat in the diet.
- Better serum lipid profile after olive oil diet.
- No difference in copper induced serum lipid oxidation.

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